

The Bioeconomy Consultants



## News Review

Issue Sixty

March 2017

**Each month we review the latest news and select key announcements and commentary from across the biofuels sector.**



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# Foreword

Welcome, welcome, to this month's Biofuels News Review, brought to you by NNFFCC.

One biofuels story this month seriously impressed us in the office, not so much due to its findings per se, as they were unsurprising, but for the way in which they came about. NASA has recently conducted a study into emissions from aviation biofuels, finding that biofuels used in jet engines reduce particle emissions by up to 70%, a result that will come as no surprise to anyone even vaguely familiar with biofuels. While it is great to have an organisation as prominent as NASA come out with information in favour of biofuels, what impressed us most about this study was that the emissions were empirically tested... while the plane was flying. The emissions were collected at the point of release by a fighter pilot flying directly behind the plane being tested, which has to rank as one of the most daredevil scientific experiments in history! The fuel used was a 50% biofuel mixture, which is much higher biofuel content than is currently employed by the industry, so hopefully this result indicates imminent progress in the aviation biofuels sector.

Far closer to home than the California airspace, biofuels continue to make leaps and bounds towards becoming first choice here in Europe. The European Renewable Ethanol Association has conducted an opinion poll of over 11,000 people across all 28 EU member states, finding nearly 70% of those surveyed to be in favour of biofuels. This result should hopefully put pressure on the European Parliament to make biofuels a priority for development, as increasing numbers of people are aware of the benefits all across the European economy.

Read on for the latest market news.

# Policy

## US Biofuels industry wants no change to Renewable Fuel Standard

Leading organizations of the U.S. biofuels and agricultural industries have written to EPA administrator Scott Pruitt opposing any change to the Renewable Fuel Standard point of obligation. They also want Reid Vapor Pressure restrictions lifted on E15 so it can be sold year-round. Nebraska Ethanol Board Administrator Todd Sneller says rather than going through Congress, the groups felt it was better to seek EPA's assistance.

Sneller says the EPA hasn't followed the proper protocols in applying the law to either point of obligation or the Reid Vapor Pressure rule.

Sneller says asking the agency for regulatory relief is the best option since the Trump administration has already used this power on other issues, some through executive orders.

Sneller says the groups noted in their letter to Pruitt that the proposed effort to shift the point of obligation would increase by almost 800 percent the number of entities required to comply with the RFS.

Click [here](#) for more information.

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## Large support for biofuels across EU consumers



*Wikimedia Commons*

The German Bioethanol Industry Association (BDBe) announces the markedly positive attitude to plant-based biofuels revealed by a Europe-wide opinion poll. 69 per cent of the consumers surveyed in the 28 EU Member States are in favour of increased use of these biofuels, with only 15 per cent opposed and 16 per cent with no opinion on the topic.

Responses from 11,283 participants in the 28 EU Member States were analysed in the poll commissioned by the European Renewable Ethanol Association (ePURE).

In Germany, the majority of poll participants (61 per cent) supports the use of biofuels, 23 per cent are opposed and 16 per cent have no opinion on the topic. In France 73 per cent of consumers are in favour of biofuels, 13 percent are against and 14 per cent of respondents have no view.

Click [here](#) for more information.

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## Identification of barriers to US Advanced Biofuels industry

Although the 2005 Environmental Protection Act (EPA Act) was enacted to bolster the emerging

biofuel industry, 52% of advanced biofuel (AB) projects ended by 2015. However, there are no complete lists of internal and external barriers that can help to explain why these projects are failing. The goal of this study was to develop a list of barriers impeding advanced biofuel projects by conducting a survey of biofuel stakeholders. Based on a literature review and previous research, a list of 23 hypothesized internal and external barriers was elaborated. A survey was conducted to have industry stakeholders provide their perception on the list of hypothesized barriers. The perceptions of industry stakeholders were analysed by dividing the sample in three different stakeholder groups: advanced biofuel industry members, government representatives, and a third category called others that included publishers, journalists, suppliers, and other related stakeholders to the industry. In addition, nonparametric statistical techniques were used to compare the perceptions of the groups. The most significant results indicated that Technology issues was considered as an internal barrier for the three groups while Funding and Renewable Fuel Standards were perceived as external barriers by the three groups too. In addition, the rating of barriers was further analysed only by AB industry stakeholders in order to uncover more details on the perception of barriers that might be preventing the AB industry to prosper.

Click [here](#) for more information.

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## How do biofuels affect food security?



*Max Pixel*

In the past, controversy has arisen over the links between liquid biofuels and food security (see, for example, studies by FAO, IFPRI, IIASA and CFS). Liquid biofuels, such as ethanol and biodiesel, constitute a small fraction of bioenergy use. While the use of liquid biofuels has increased in recent years, it remains only about 0.5% of all energy consumed (see statistics here). Biofuels became popular in government policies, first to improve domestic energy security and later also as a means to reduce climate impact. Liquid biofuels are particularly useful in the transport industry, and some recent studies show they could have unexpected climate benefits. But considerable subsidies offered for the production of biofuels have led to questions over undue competition with food production on lands suitable for agriculture. These have impacted food prices and food security. Socioeconomic, ethical, environmental and rights-based arguments were raised at the 2008 Food Summit in Rome. Policies around liquid biofuels remain contentious, although there are expectations that new technology using non-food feedstock, such as cellulose, can provide new opportunities.

The extent to which food production is a limiting factor for food security can, of course, be debated. One reflection is that during more food-insecure times in history, we used a much higher proportion of agricultural land and produce than today to feed our means of transportation – namely, oxen and horses. That said, policies that



pay out subsidies for otherwise unprofitable biofuel production need to be well scrutinized for efficiency, as well as unfair competition with food.

Click [here](#) for more information.

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# Markets

## Biodiesel prices set for uncertain times



*Pixabay*

AHDB reports on the uncertainties facing oilseed markets as a result of the impacts of decisions affecting use in the biodiesel market.

Global biodiesel production reached record levels in 2016, of close to 32 million tonnes, following a dip in 2015. The EU and US are responsible for a sizeable chunk (roughly 56%) of world biodiesel output. As a result, policy decisions in these regions will have a bearing on both the sector as a whole and on overall vegetable oil demand. In the UK production is mainly from waste oils. However, rapeseed oil is the main vegetable oil used in EU biodiesel production, with an average of 6Mt used per year. This equates to around 60% of total EU rape oil production. Biodiesel has shown little or no growth in the EU recent years, in part reflecting future uncertainty around how the level of crop-derived biofuel that will be permitted to be supported within the EU post 2020. The EU may also be indirectly affected by impacts of fuels policy in the US.

A record 5.22Mt of biodiesel was produced in the US in 2016. As soyabean oil is the main feedstock used (on average 54% of US biodiesel is produced from soyabean oil), the amount of soyabean oil used was also at record levels (2.77Mt).

In November 2016, the US Environmental Protection Agency (EPA), published the final Renewable Fuel Standard (RFS) for 2017 and the biodiesel mandate for 2018. The RFS is a US policy which aims to replace petroleum based fuel with a set volume of renewable fuel. There are increases for all types of biofuels, including a 5% increase for biodiesel. Biodiesel production can also be used to fulfil the advanced biofuels category, the obligation for which has been increased by 6.5% year on year for 2017.

However, the Trump administration has delayed the implementation of the 2017 RFS until at least 21 March. The US blenders' credit, which provided a subsidy of \$1/gallon of biodiesel blended, was active during 2016 and would have served as an incentive for higher production. However, the credit expired on 31 December 2016 and there are concerns that it may not be renewed. Argentine produces a record 2.66Mt of biodiesel in 2014, a significant proportion of which was exported to the US taking advantage of the US blenders credit. If not renewed, or converted into a producer's credit (to support US production) there could be significant volumes of Argentinian soy oil looking for a market, which could depress EU oil prices.

The next few months of policy making could have significant impacts on the global oil trade.

Click [here](#) for more information.

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# Research & Development

## **DISCOVER project to improve algae yields for biofuels**



*Wikimedia Commons*

A new \$6 million Development of Integrated Screening, Cultivar Optimization and Validation Research (DISCOVER) project has been announced by Sandia National Laboratories, whose goal is to determine which algae strains are the toughest and most commercially viable.

The U.S. DOE's Office of Energy Efficiency and Renewable Energy sponsors the project, and Sandia National Laboratories partners are Los Alamos and Pacific Northwest national laboratories, the National Renewable Energy Laboratory and Arizona State University.

An estimated 30 percent of current production on algae farms is lost each year due to pond crashes. The national labs, and Sandia with its expertise on algae predators will use its 1,000-litre indoor algae raceway facility, as a "crash lab", using a range of known predators. Collapses can take as little as 48hrs with severe infestations of algal predators.

By determining the most resilient algae strains and best practices for algae farming, Sandia and its partner labs aim to one day enable farmers to produce enough algae to make biofuels a real competitor at the pump.

Click [here](#) for more information.

# Bioethanol

## **Alliance Bioenergy makes offer for ethanol plant**

Alliance BioEnergy Plus, Inc. announced that it has submitted an offer to purchase a 145+ acre ethanol plant previously owned by INEOS New Planet Bioenergy in Vero Beach, Florida.

If successful the Company will begin to retrofit the front end of the facility immediately with its patented CTS process and quickly be converting local yard waste into Cellulosic Ethanol through an option agreement with the County.

INEOS Bio broke ground on the plant in February 2011 and completed the \$130 million facility in 2012.

The offer signals a critical, yet exciting next step in the evolution of the patented CTS process. If successful and up and running at capacity, sometime in early 2018 the facility will produce 8 million gallons a year of Cellulosic Ethanol valued at \$33 million a year with a pre-tax profit of more than \$24 million a year.

The Company has begun the due diligence phase of the process and will assess the viability of the land, feedstock, permits, years of testing and activity at the site as well as local, state and federal environmental filings and regulations.

Click [here](#) for more information.

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## **Greenbelt Resources develops ethanol-producing "ecosystem"**

California-based sustainable energy production company Greenbelt Resources Corp. has unveiled a new waste-to-energy interconnected system designed to produce half a million gallons of bioethanol from a variety of feedstocks.

The system is called Paso Robles ECOsystem (PRECO). PRECO utilises such feedstocks as waste

trub from the nearby Firestone Brewery and winery wastes from the over 310 wineries in the local area.

According to Greenbelt, PRECO will be the first independently owned, local-scale bioethanol solution in California and is tailored to utilise the local Paso Robles supply of agricultural and beverage residues.

The ecosystem can also be custom-designed to transform the feedstocks of any local area into bioethanol and bioproducts. The resulting bioethanol will be sold into California's transportation market under the state's Low Carbon Fuel Standard (LCFS), leading to higher revenues.

The legislation was designed to lower toxic tailpipe emissions and carbon dioxide, a climate change gas. According to Greenbelt, California represents potential project revenue of nearly \$1 billion.

Click [here](#) for more information.

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## Clariant releases new catalyst for methanol production



*Clariant*

In Germany, Clariant has launched of a new generation of high-performance catalysts for the steam reforming process in the production of hydrogen, ammonia and methanol. The new ReforMax 330 LDP Plus and ReforMax 210 LDP Plus catalysts are designed with a unique and innovative 8-hole flower-like configuration that ensures an extremely low pressure drop in the tubular reforming reactor while offering outstanding catalyst activity and selectivity.

Steam reforming is a principal industrial process used to manufacture synthesis gas (syngas) as required for the production of hydrogen, ammonia and methanol. The heart of the process is the tubular steam reformer where hydrocarbon feed, such as methane, reacts catalytically with steam to form a mixture of hydrogen, carbon oxide and carbon dioxide (syngas). The shape of the catalyst used for primary reforming plays a key role in the catalyst's activity, heat transfer, pressure drop and physical strength.

The new ReforMax LDP Plus catalysts offer optimized shape parameters. They build on the success of Clariant's previous ReforMax LDP series, which is commercially proven to be highly effective for any condition of process feed and design. However, compared to its 10-hole predecessor, the new 8-hole "floral" design of ReforMax LDP Plus allows an outstanding pressure drop decrease of up to 20%. This allows plant operators to significantly reduce energy costs and/or increase the reformer gas throughput in existing plants.

Moreover, the new catalysts retain the very high geometric surface area of the ReforMax LDP 10-hole shape, thus maintaining high activity for the steam reforming reaction. Heat transfer is improved thanks to increased hole diameters. Particularly when used together, ReforMax 330 LDP Plus and ReforMax 210 LDP Plus effectively suppress carbon formation in the process.

Click [here](#) for more information.

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## Abengoa sells bioethanol plants to private equity firm

Abengoa, the international company that applies innovative technology solutions for sustainability in the energy and environment sectors, and Trilantic Europe have signed an agreement to acquire its four bioethanol plants in Spain and France. The deal is valued at €140 M including the debt assumed by the buyer and the minority interests.



Closing of the transaction is expected to take place once a number of conditions precedent have been met.

This operation, along with other ones planned by the company currently in advanced stages of negotiation, represents a further step in the company's viability plan in which the company is currently carrying out and culminates the process of selling biofuel assets in Europe. Over the past months, Abengoa has announced its agreement with Ericsson for the sale of its subsidiary Abentel, its participation in the solar thermal plant Shams-1 in the United Arab Emirates, as well as the Campo Palomas wind farm in Uruguay and its participation in Yoigo, among others.

Click [here](#) for more information.

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# Biodiesel

## Amsterdam's patrol fleet now powered by biodiesel



*Wikimedia Commons*

Following a previous successful pilot, GoodFuels Marine has also won Port of Amsterdam's tender for its fleet of five patrol vessels. The vessels will now run on fuel containing 30% exceptionally high-quality biodiesel. This will reduce CO<sub>2</sub> emissions by 25% compared to fossil diesel.

GoodFuels' renewable 'drop-in' biofuel is a sustainable and high-quality alternative to fossil

diesel. The blend used by Port of Amsterdam contains 30% advanced second-generation biofuels and complies to the EN590 norm. This means it can be used directly in all diesel engines without any modifications to the engine and the factory warranty remains valid. The sustainable biodiesel is produced from certified waste flows that cannot be used in other industries or for other purposes. This promotes the circular economy.

Click [here](#) for more information.

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## Insight of seven kinds of biofuel crop

A method of producing fuel from plants or other sources could potentially allow us to decrease our dependence on fossil fuels. Energy crops, so-called, include wheat, corn, soybean and sugarcane. Biofuels burn cleaner than fossil fuels, release fewer pollutants and greenhouse gases, such as carbon dioxide, into the atmosphere. They are sustainable and energy companies mix them with gasoline. Unlike oil, coal or natural gas, biofuels, in theory at least, are renewable.

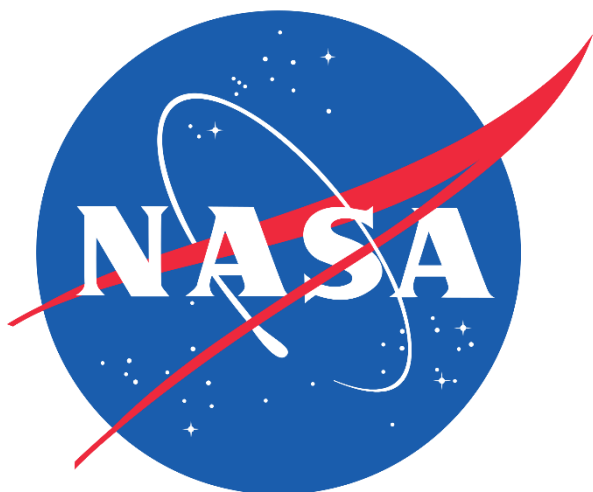
Biofuels generally fall into two categories, bioalcohol and biodiesel. The former, such as ethanol, is created by engineers from yeast and bacteria to break down starch from corn and other plants. Biodiesel, on the other hand, is created in refineries that use existing oil in crops such as soybeans. These kinds of vegetable oils are then treated with alcohol to convert them to biodiesel.

As you can imagine, there are some drawbacks to these kinds of fuels. Issues include things like the amount of land space required to grow the crops. This, in particular, creates problems with higher food prices and deforestation. The latter being somewhat counter-productive to the aim. Additionally, the costs for converting crops in energy crops, as well as the need to retrofit existing vehicles and power plants to run on them is not cheap.

Click [here](#) for more information.

# Aviation Fuel

## Aviation Biofuel emission reductions tested... In-Flight!



NASA

Using biofuels to help power jet engines reduces particle emissions in their exhaust by as much as 50 to 70 percent, in a new study conclusion that bodes well for airline economics and Earth's environment.

The findings are the result of a cooperative international research program led by NASA and involving agencies from Germany and Canada, and are detailed in a study published in the journal *Nature*.

During flight tests in 2013 and 2014 near NASA's Armstrong Flight Research Centre in Edwards, California, data was collected on the effects of alternative fuels on engine performance, emissions and aircraft-generated contrails at altitudes flown by commercial airliners. The test series were part of the Alternative Fuel Effects on Contrails and Cruise Emissions Study, or ACCESS.

Contrails are produced by hot aircraft engine exhaust mixing with the cold air that is typical at cruise altitudes several miles above Earth's surface, and are composed primarily of water in the form of ice crystals.

Researchers are most interested in persistent contrails because they create long-lasting, and sometimes extensive, clouds that would not normally form in the atmosphere, and are believed to be a factor in influencing Earth's environment.

That's important because contrails, and the cirrus clouds that evolve from them, have a larger impact on Earth's atmosphere than all the aviation-related carbon dioxide emissions since the first powered flight by the Wright brothers.

The tests involved flying NASA's workhorse DC-8 as high as 40,000 feet while its four engines burned a 50-50 blend of aviation fuel and a renewable alternative fuel of hydro processed esters and fatty acids produced from camelina plant oil. A trio of research aircraft took turns flying behind the DC-8 at distances ranging from 300 feet to more than 20 miles to take measurements on emissions and study contrail formation as the different fuels were burned.

The trailing aircraft included NASA's HU-25C Guardian jet based at Langley, a Falcon 20-E5 jet owned by the German Aerospace Centre (DLR), and a CT-133 jet provided by the National Research Council of Canada.

Researchers plan on continuing these studies to understand and demonstrate the potential benefits of replacing current fuels in aircraft with biofuels. It's NASA's goal to demonstrate biofuels on their proposed supersonic X-plane.

Click [here](#) for more information.

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## ICAO deal only covers CO2 emissions

Last October, the 191 member states of the United Nation's International Civil Aviation Organization (ICAO) agreed to a new deal to cap international aviation emissions using a carbon offset approach.

Despite relief from some quarters that this long-awaited deal – which aims to cap growth in aviation emissions at 2020 levels – had finally

been achieved, there is still a long way to go before the problem of fast-rising aviation emissions is solved.

First, the offsetting nature of the ICAO scheme means countries still need to translate exactly how a deal – which doesn't actually stop aircrafts emitting more CO<sub>2</sub> and only begins in four years – will be able to align itself with the limits in global temperature rise set out in the Paris Agreement.

Second, there is another rather ominous hole in the efforts to tackle flight emissions which remains all but completely neglected.

The new ICAO deal only addresses CO<sub>2</sub> emissions, ignoring other emissions from planes which research has shown could result in warming several times greater than for CO<sub>2</sub> alone.

This article takes a look at the impact of these non-CO<sub>2</sub> emissions and examines new research setting out how they could be limited.

Click [here](#) for more information.

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## Discussion of biofuel prospects for aviation



*Pixabay*

At any one time, more than half a million people are speeding towards their destinations at 34,000 feet. The US, meanwhile, rarely has fewer than 5,000 aircraft simultaneously criss-crossing its airspace. The stratosphere will become even more crowded in future. Thanks to the increased wealth of the middle classes in emerging markets, our

skies could be positively teeming with aircraft within a generation.

That's a worrying prospect for several reasons. But perhaps the biggest concern of all is the impact air congestion might have on the environment. Currently, aircraft generate some 705 million tonnes of greenhouse gas emissions per year, or 12 per cent of the total produced by mechanised transport. According to the International Civil Aviation Organisation, however, jetliners could be belching out as much as seven times that amount by 2050.

Rather than embark on what would ultimately be a futile effort to stymie air travel, policymakers and the airline industry see improved technology as key to solving the pollution problem.

Of all the innovations currently under development – aircraft re-design, solar cells, hydrogen-powered engines – it is biofuel, fuel that is extracted from organic matter, that represents perhaps the most feasible way of reducing aviation's impact on the environment.

The most established aviation biofuels are those produced from food crops such as maize, rapeseed, corn and grain, all of which are rich in essential vegetable oils. When these oils are combined with methanol, the chemical reaction that ensues produces a biofuel that can be used as an alternative to kerosene.

A similar process that makes aviation fuel from municipal waste has also recently come into commercial use.

Click [here](#) for more information.

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# Other Fuels

## UK gets first Hydrogen filling station



Shell

Shell has announced the launch of its first hydrogen refuelling station in the UK at its Cobham service station on the M25. The new hydrogen station has been supplied by ITM Power and is the first fully branded and public hydrogen refuelling site in the UK. It is the first of three hydrogen stations Shell plans to open in the UK in 2017.

The hydrogen is generated on-site using an electrolyser which requires only water and electricity to generate the hydrogen gas. The hydrogen station at Cobham is the third hydrogen site in the UK to be supplied by ITM Power and opened as part of the HyFive project. The initiative has been partially funded by the European Fuel Cell, Hydrogen Joint Undertaking, and the UK's Office of Low Emission Vehicles.

The opening of Shell's first UK hydrogen site follows the success of sites in California, and in Germany where Shell is part of a joint venture with the ambition to open a network of up to 400 hydrogen sites by 2023.

Click [here](#) for more information.

## UK Government announces fund for Hydrogen fuel development

A new £23 million fund to accelerate the take up of hydrogen vehicles and roll out more cutting-edge infrastructure has been announced by the government today (18 March 2017).

Hydrogen fuel providers will be able to bid for funding in partnership with organisations that produce hydrogen vehicles to help build high-tech infrastructure, including fuel stations. The funding will boost the creation of hydrogen fuel infrastructure and uptake of hydrogen-powered vehicles.

A competition will be launched this summer, and will invite proposals from public organisations, businesses and hydrogen operators. The government will provide match funding for successful bidders as part of its plans to cut carbon emissions, improve air quality and deliver economic opportunities for the UK.

Hydrogen vehicles can be quickly refuelled using a pump like a conventional petrol or diesel car, but instead use gas. They produce only water as a by-product and have a range of around 300 miles per tank, like conventional vehicles.

The government is working closely with industry on the future direction of the UK automotive sector and has allocated over £600 million for low emission vehicles over the course of this Parliament with an additional £390 million announced at last year's Autumn Statement for ultra-low emission vehicles and driverless cars.

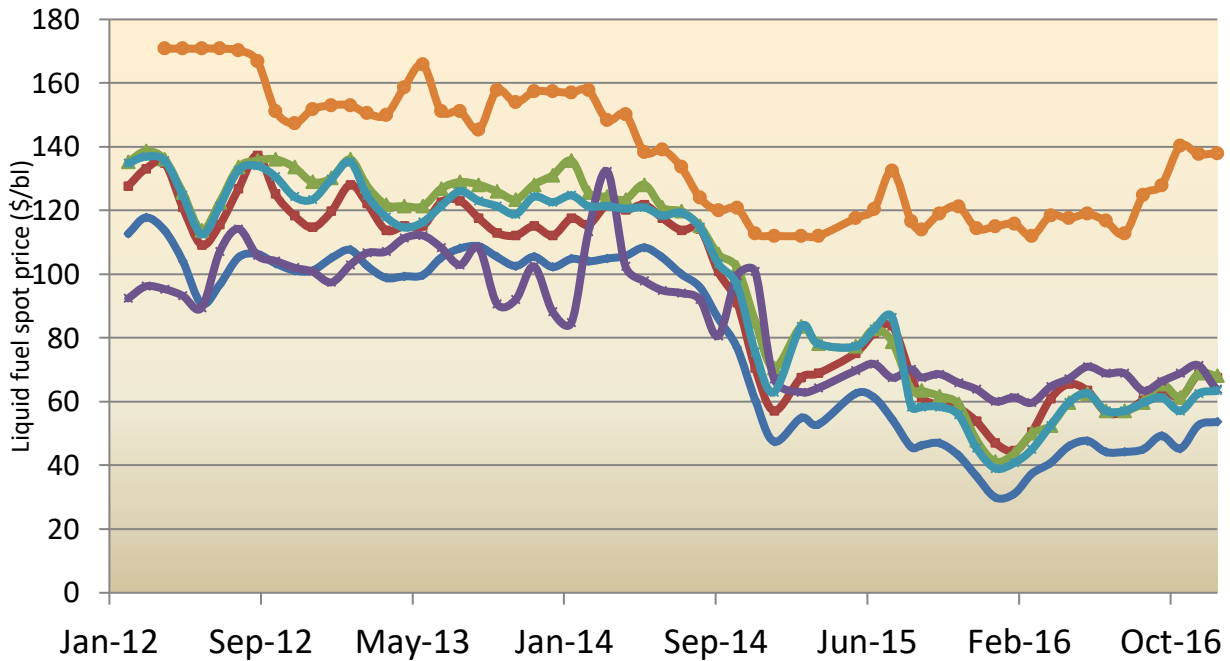
Today's announcement builds on the launch of the Industrial Strategy green paper published in January which outlined plans to fund new high-value economic infrastructure and reaffirmed government commitment to investing in energy innovation and to tackling the causes of climate change.

Click [here](#) for more information.



# Price Information

Historical spot prices of liquid fossil fuels and liquid biofuels. Five years' prices up to February 2017 are given in \$ per barrel.



- Crude Oil (petroleum), simple average of three spot price
- Gulf Coast Gasoline
- Diesel - New York Harbor Ultra-Low Sulfur No 2 Diesel Spot Price
- Ethanol Average Rack Prices F.O.B. Omaha, Nebraska
- Jet Fuel Spot Price FOB - U.S. Gulf Coast Kerosene
- FAME 0° FOB ARA

Prices of Crude oil, diesel, gasoline, and jet fuel are recorded from [www.indexmundi.com](http://www.indexmundi.com); Price of ethanol from [www.neo.ne.gov](http://www.neo.ne.gov); Biodiesel spot prices from <http://www.kingsman.com>

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